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(54) Title: A PORTABLE RECEIVER AND A BROADCAST SYSTEM AND OPERATING METHODS

(57) Abstract: A portable electronic receiver terminal (1) for digital services, which terminal (1) comprises a plurality of receiver circuits (3), of which circuits (3) at least one receiver circuit is adopted to receive a transmission of at least one digital broadcast channel (5) comprising data (7), which transmission being transmitted by at least one broadcast transmitter (9), an electrical power supply battery means (11) connected to a processor unit (15) being associated with said receiver circuits (3) and with a storage means (17) for storing said data (7), and said receiver circuit (3) is controlled by said processor unit (15) to receive a specific part (19) of said data (7) for storage in said storage means (17) being used by a client (21) for later consumption. Said receiver circuit (3) is adopted to receive, in advance of the transmission of said specific part (19) of said data (7), at least one scheduling data signal (23), such as scheduling information, embedded in said broadcast channel (5), said processor unit (15) is adopted to control said receiver circuit (3) to receive said specific part (19) of said data (7) by means of at least one of said in advance received scheduling data signal (23), comprising information regarding when said specific part (19) of said data (7) will be transmitted.

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A portable receiver and a broadcast system and operating methods

BACKGROUND OF THE INVENTION

The present invention relates to a portable electronic receiver terminal for digital services according to the preamble of claim 1 and a broadcast generation system for transmission of digital broadcast channels according to the preamble of claim 9. And more particularly, to terminals for receiving and systems for providing multimedia broadcast non-real time services. The present invention also relates to methods for
10 operating the receiver according to the preamble of claim 7 and generating the broadcast channels according to the preamble of claim 16.

Broadcast non-real time services can consist of one single file, for example a video or sound clip, or can comprise a plurality of files, wherein each file can be individually
15 updated. Such a file can be provided for web like services, multimedia web-zines etc. The data is stored in a storage memory of the receiver for later consumption. Thus, a client, such as a user of the terminal, can view or listen to a specific program in non-real time.

20 By using the ether as a medium, the client can act without the need of keeping the terminal connected on-line. His terminal will download that content, which he is interested in, and such services for which he acts as a subscriber.

Thus, when the client switches on the terminal for consuming this specific service,
25 earlier stored but not wanted data is discarded. Thus, the portable electronic receiver terminals for digital services according to known technique, such as terminals for broadcast data, audio signals, video signals and also broadcast mode in telephony systems for co-operation with services of telecommunication signals etc, have a high power usage.

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However, several attempts have been performed for trying solve this problem by providing battery cells with long duration, but since the power consumption is high in portable receiver terminals of today, multimedia services in non-real and/or real time can be used by the client only for a short time period. The client must recharge the terminal with fresh battery cells or reload energy. This is costly and will take time for the client. This prevent the client being mobile over a longer period of time.

A television broadcast system, such that shown in EP 0 975 109 A1, may comprise control means extracting the transmission time of utilization data to be transmitted to a receiver identifier which agrees with a self receiver identifier, from an extracted transmission schedule information, and stops power supply to a part other than the control means, when a viewer does not watch the program. Battery life problem solving is not addressed.

However, since a portable terminal has to be light and yet no battery cells with sufficient long range are on the market today, the above mentioned problem has not been solved by known technique.

SUMMARY OF THE INVENTION

This has been solved by a portable electronic receiver terminal as initially defined, which terminal is characterized by that the receiver circuit is adopted to receive, in advance of the transmission of said specific part of the data, at least one scheduling data signal, such as scheduling information, embedded in the broadcast channel, and the processor unit is adopted to control the receiver circuit to receive the specific part of the data by means of at least one of the in advance received scheduling data signal, comprising information regarding when the specific part of the data will be transmitted.

In this way it is possibly to save energy, depending on the number of single channels for the moment being transmitted to the receiver. That is, it will be possible to save

energy by not receiving a data transmission of a channel transmitted containing data that is redundant or not wanted. Thus, energy will be saved and the client can use his terminal for longer time without the need of recharging it so often as being the case with terminals according to known technique.

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Suitably, a switch member is associated with the electrical power supply battery means, the processor unit and the receiver circuit, which switch member is controlled by the processor unit and comprises a switch position for activating the receiver circuit for receiving the specific part of the data.

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Hereby the energy will be saved at the same time as the terminal according to the present invention provides the terminal for making a client subscription in such a way that a personal profile being stored in the terminal. This profile is adopted for an individual client and provides that just wanted data for later consumption will be received by means of the processor unit automatically switching on the receiver circuit for receiving the specific part of the data.

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Preferably, the switch member is controlled by the processor unit for turning of the receiver circuit when the specific part of the data has been transmitted.

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In such a way the usage of the receiver circuit will be reduced to just the moments when wanted data is transmitted. The processor unit of the terminal compares the received scheduling information data of the profile of the client. In such a way the processor unit of the terminal determines which services are wanted and controls the receiver to be activated or not. Thus, the terminal can be adopted for not receiving repeated or not subscribed or wanted data. This reduces the power consumption.

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Suitably, the receiver circuit is adapted to receive a broadcast transmission comprising one channel, which channel comprises the scheduling data signal.

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Hereby the terminal is adopted for receiving broadcast transmissions of single channel system. Scheduling information, comprising information about what specific content is going to be transmitted and when this content will be transmitted, can be located either in every data packet structure or frame or can be comprised in the transmission in pre-defined time intervals.

Preferably, the receiver circuit is adapted to receive a broadcast transmission comprising a plurality of sub-channels, of which at least one comprises the scheduling data signal.

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In such a way the portable terminal according to the invention is adopted for multiplexed multi-channel systems. In multiplexed digital broadcast systems, some receivers can receive data of one or more so-called sub-channels in parallel. In the case of reception of parallel sub-channels, the power consumption is depending on the combined bandwidth, wherein energy can be saved even if only one sub-channel is shut-down instead of the complete receiver circuit.

15

Advantageously, the receiver circuit is adapted to receive a broadcast transmission comprising two or more sub-channels, which channels comprise the scheduling data signal.

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In this way two or more sub-channels may cooperate regarding the scheduling information. Thereby it is possible to duplicate the same information in two or more different sub-channels. If one data packet structure comprising the specific part of the data being received for later consumption and by means of its embedded scheduling information will control the terminal to switch on the receiver circuit for a later reception of a second data packet structure, and another sub-channel with this second data packet structure comprising scheduling information is used, the first sub-channel does not have to comprise that frequent transmitted scheduling data signals, whereby the receiver circuit does not have to be switched on so often. This also reduces the power consumption.

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This is also an advantage for a sub-channel scheduling information producer, since the producer can influence several sub-channels of the transmission and the total bandwidth of the broadcast in a satisfactory manner. However, there is an upper limit
5 of the number of sub-channels comprising scheduling data signals controlling the portable terminals of the clients.

The problems mentioned in the first portion of the description have been solved by a method for operating a portable electronic receiver terminal of that in the introduction
10 mentioned, which method is characterized by the steps of receiving a scheduling data signal, such as scheduling information, comprising information regarding when the transmission of a specific part of the data will be transmitted, controlling the receiver circuit to receive the specific part of the data, storing the specific part of the data in the storage means, and using the specific part of the data for later consumption.

15

Furthermore, the method may comprise the steps of switching on the receiver circuit to receive the specific part of the data, and switching off the receiver circuit when the specific part of the data has been transmitted, controlling the receiver circuit by means of an oscillator unit associated with the processor unit for activating the receiver
20 circuit when a plurality of the scheduling data signals is transmitted, which signals are embedded with periodicity in the broadcast channel.

Hereby the receiver circuit can be controlled to receive only that data, which the client is interested in and at the same time the control mechanism will save energy.

25

The problems mentioned in the introduction of the description have also been solved by a broadcast generation system for providing data signals for transmission of at least one digital broadcast channel and a method regarding this system, which system and method are initially defined. The system is characterized by that the multiplexed
30 broadcast channel unit is adopted to provide the multiplex output signals with at least one scheduling data signal, such as scheduling information, comprising information

regarding when a specific part of the data will be transmitted, the scheduling data signal being transmitted in advance of the transmission of the specific part of the data, and the scheduling data signal being provided for controlling at least one receiver circuit of the terminal to receive the specific part of the data by means of at least one
5 of the in advance received scheduling data signal.

Preferably, the scheduling data signal is adopted for activating the portable electronic receiver terminal for receiving the specific part of the data and the scheduling data signal is adopted for turning off the receiver circuit when the specific part of the data
10 has been transmitted.

Suitably, the scheduling data signal is transmitted with periodicity, wherein the receiver circuit being activated when the scheduling data signal is transmitted.

15 The method for generating at least one digital broadcast channel according to the present invention is characterized by the steps of processing in the multiplexed broadcast channel unit the service data for providing a specific part of the data of the broadcast channel, providing at least one scheduling data signal comprising information regarding when the specific part of the data will be transmitted,
20 transmitting the specific part of the data being received by the portable electronic receiver terminal.

In this way the client can use the terminal according to the present invention in longer user intervals and save money, since he does not have to change battery cells or re-
25 load the terminal as frequently as the case with prior art. The client will be even more mobile than with prior art and can make use of the transmissions in the ether medium for longer time without re-loading the terminal with new energy.

BRIEF DESCRIPTION OF THE DRAWINGS

- FIG. 1 is a diagrammatic view of a portable electronic receiver terminal according to the present invention,
- 5 FIG. 2 is a diagrammatic view of a broadcast generation system according to the present invention,
- FIG. 3 is a diagrammatic view of a data packet structure comprising control data,
- FIG. 4 is a diagrammatic view of the relation between the re-synchronisation and the raw data transmission time,
- 10 FIG. 5 is a diagrammatic view of a single channel transmission for saving energy,
- FIG. 6 is a diagrammatic view of a multiplexed multi-channel transmission according to the present invention,
- FIG. 7 is a diagrammatic view of a broadcast transmission comprising two sub-channels, and
- 15 FIG. 8 is a diagrammatic view of a portable terminal of FIG. 1 provided for saving energy.

DESCRIPTION OF THE INVENTION

- 20 FIG. 1 is a diagrammatic view of a portable electronic receiver terminal 1 according to the present invention. The portable electronic receiver terminal 1 for digital services comprises a plurality of receiver circuits 3. At least one receiver circuit 3' is adopted to receive a transmission 8 of at least one digital broadcast channel 5 comprising data 7.
- 25 The transmission 8 is transmitted by at least one broadcast transmitter 9 and received by the receiver circuit 3' via an antenna 14. An electrical power supply battery means, such as a battery, 11 is via electrical wires (not shown) connected to a processor unit 15 being associated with the receiver circuits 3 and with a storage means 17 for storing a specific part 19 of the data 7 (see FIG. 3).

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The receiver circuit 3' is controlled by the processor unit 15 to receive a specific part 19 of the data 7 (see FIG. 3) for storage in the storage means 17 being used by a client 21 (see FIG. 2) for later consumption. The specific part 19 of data 7 may be a certain news-program ordered by a client beforehand. A switch member 25, such as a
5 conventional switch, is located between the power supply battery means 11, such as battery cells, and the processor unit 15. The receiver circuit 3' is adopted to receive at least one scheduling data signal 23, such as scheduling information, embedded in the broadcast channel 5. For saving energy regarding the power supply 11, the processor unit 15 is adopted to control the receiver circuit 3' to receive the specific part 19 of the
10 data 7 by means of at least one of the in advance received scheduling data signal 23 (see FIGS. 5-7), comprising information regarding when the specific part 19 of the data 7 will be transmitted.

The switch member 25 is associated with the electrical power supply battery means 11, the processor unit 15 and the receiver circuit 3. Furthermore, the switch member 25 is
15 controlled by the processor unit 15 and comprises a switch position for activating the receiver circuit 3' for receiving the specific part 19 of the data 7. The switch member 25 is controlled by the processor unit 15 for turning off the receiver circuit 3' when the specific part 19 of the data 7 has been transmitted. A control data for executing this
20 order is also embedded in the scheduling data signal 23, which is earlier received. In FIG. 1 is also shown a display, such as a screen 26, and an input member 28, such as a keyboard, touchscreen etc. The screen 26 is schematically illustrated. The client 21 can order above-mentioned specific service by means of the input member 28 and controlling the activities. The screen 26 and the keyboard is connected to the processor
25 unit 15.

FIG. 2 is a diagrammatic view of a broadcast generation system 101 according to the present invention. The broadcast generation system 101 provides data signals 103 for the transmission 8 of at least one digital broadcast channel 5 comprising data 7 (see also
30 FIGS. 5-7). The transmission 8 is provided for a plurality of clients 21 each using a portable electronic receiver terminal 1 for digital services. The broadcast generation

system 101 comprises at least one service provider unit 105 for delivering service data, such as metadata, raw content data etc.

The service provider unit 105 is associated with at least one multiplexed broadcast channel unit 107 for providing multiplex output signals for forming transmission frames 109 in a modulator unit 111 adopted for said transmission. Updates of the news-program will also be fed into the multiplexed broadcast channel unit 107 via the service provider unit 105.

When an update is going to be transmitted, information about when the update will take place will be provided in the scheduling data signal 23 by means of the broadcast generation system 101 according to the present invention, whereby the receiver circuit of the terminal 1 will be turned on during the transmission of this specific update news. Thus, the receiver circuit 3' of the terminal 1 does not have to be turned on all the time for receiving all updates. The multiplexed broadcast channel unit 107 is adopted to provide said multiplex output signals with at least one scheduling data signal 23, such as scheduling information, comprising information regarding when a specific part 19 of the data 7 will be transmitted.

The scheduling data signal 23 is transmitted in advance of the transmission of the specific part 19 of the data 7. The scheduling data signal 23 is provided for controlling the receiver circuit 3' to receive the specific part 19 of the data 7 by means of at least one of the in advance received scheduling data signal 23. The method for operating the terminal 1 comprises the steps of receiving the scheduling data signal 23, controlling the receiver circuit 3' to receive the specific part 19 of the data 7, storing the specific part 19 of the data 7 in the storage means 17, and using the specific part 19 of the data 7 for later consumption.

The information regarding what kind of services that will be transmitted and when they will be transmitted is set in the scheduling information being provided by a scheduling data signal generating unit 110, co-operating with the service provider units

105. This information will then be assembled into a set of data in frames 109 comprising the data signals 103, which signals 103 are passed to a transmission unit 114, according to known technique, comprising the modulator unit 111 provided for the broadcast transmission 8. The scheduling information is thus provided by the
5 multiplexed broadcast channel unit 107.

A plurality of data storage means 116, such as carousels, are associated with each other for providing the data signals 103. The data storage means 116 are controlled by a central processor unit (not shown) in the main service unit 107, wherein the data
10 storage means 116 generates actual data and provides the scheduling information to be assembled into the frames 109 and into a specific broadcast channel 5. The service data is fed into the data storage means 116 as raw data and metadata. The metadata comprises information about the time the information will be "on the air" and when the actual information will be replaced by new information. This data is processed in
15 the scheduling data signal generating unit 110 and will form a part of the scheduling information.

The scheduling information is dependent on the service data fed into the data storage means 116. For example, when there is new update data delivered in the service
20 provider unit 105, the broadcast generation system 101 will provide the broadcast 8 comprising this new data. First scheduling information is sent, then the actual update. Thus, the client 21 with a subscription of this particular program, will have the receiver circuits of his terminal 1 automatically turned on by a decision made by the processor unit, for reception of this new data and immediately turned off when the
25 broadcast 8 of the data ends. If the transmission is repeated, the terminal 1 will not turn on the receiver circuit 3' on for reception of this already received data. This is also energy saving. The reason for repetition is to give a new opportunity for reception of data, thus providing support for clients temporary out of reach for the transmission.

30 All clients 21 will receive the scheduling information, but each terminal 1 is adopted for the individual subscriptions, whereby the terminal 1 will receive only data in

accordance with the profile stored in a memory (not shown) of the terminal 1. For example, if new service data is going to be transmitted at a specific time. The scheduling information packet sent ahead of the actual data will contain information about tuning parameters time and duration of transmission and service identification, which makes it possible for the individual clients to determine if the data is wanted or not.

FIG. 3 is a diagrammatic view of a data packet structure 200 of the data 7 of the broadcast transmission 8 (see FIG. 2). The packet structure 200 comprises the scheduling data signal 23 according to the invention. The transmitted packet structure 200 carries a multiplex of several digital services simultaneously. A portion of the multiplex contains information about how the multiplex is configured, so that the terminal 1 (see FIG. 2) can decode the signal correctly. Furthermore, the packet carries information about the services themselves and the links between different services.

The data storage means 116 (see FIG. 2) generates actual data and provides the scheduling information forwarded to the scheduling data signal generating unit 110 to be assembled into transmission frames and into a specific broadcast channel 5. The transmission frames comprises a fixed sequence of symbols according to known technique.

The data packet structure in FIG. 3 defines a broadcast system overhead OH comprising frame word and multiplex structure information (see also FIGS. 5-7). In a first step I re-synchronisation data 203 is provided. A next step II is so called transmission system overhead data 204 comprising data about the sub-channels 5'. A further step III comprises service data 205.

FIG. 4 is a diagrammatic view of the relation between the time of the transmission related to the re-synchronisation data 203 and the wanted data 205. T defines the time and B the bandwidth. FIG. 4 illustrates the time X needed for re-synchronisation of a terminal 1 receiving the specific part 19 of data 7. The time X is short in relation to the length Z of the reception of the part of data 7 comprising system overhead and content

data such as video program, audio etc. When the wanted data/non wanted data intervals are very short (seconds) it can make sense to keep the receiver oscillator running all the time to provide faster re-synchronisation time of the receiver circuit.

- 5 One embodiment of the present invention includes that the scheduling data signals 23 are embedded in the sub-channels 5'' comprising the data 7 for consumption (see FIG. 7). Another embodiment of the present invention includes that the scheduling data signals 23 are embedded in one narrow sub-channel 5' (see FIG. 6).
- 10 FIG. 5 is a diagrammatic view of a single channel C1 transmission for saving energy. The broadcast channel comprising a plurality scheduling data signals 23, such as scheduling information, for signalling the terminal 1 (see FIG. 1) to switch on the receiver circuit 3' for reception of service data which the client 21 will view later on. The scheduling data signal 23 is transmitted in pre-defined time intervals i and is
- 15 monitored more or less frequently depending on character of service.

Services with demands for news alert requires constant monitoring, while other services can use a mechanism, wherein the scheduling information is received in interval i of the received broadcast data. In those cases, the scheduling information can

20 be interleaved with services in the same channel. Depending of the kind service, the interval i can be in the range of seconds up to hours.

The broadcast system overhead OH (see also FIGS. 3 and 6-7) can be used as an alternative to a separate sub-channel for carrying the scheduling data signal 23. The

25 scheduling data signal 23 embedded in the first information service data 204 and the service data files 205 of the sub-channel 5', that is in some cases the specific part 19 of the data 7. The filled rectangles indicate the pattern of reception for one individual client 21. Areas not filled in define continuous broadcast of datafiles and/or streamed services.

A transmitted datafile a comprises the scheduling data signal 23 being received by the receiver circuit 3', which signal will be compared and processed in the processor unit with a user subscription profile whereby the processor unit controls to switch on the receiver circuit 3' after that a certain time period has passed for reception of datafile b.

5 The scheduling data signal 23' is also signalling that next scheduling data signal 23'' will be embedded in datafile d, which also will be received and stored in the storage means 17 (see FIG. 1) for later consumption. The client 21 is not interested of receiving the datafile c, whereby the receiver circuit 3' will be switched off during the time t'. In this way the terminal 1 will use less energy. In FIG. 5 is schematically

10 illustrated the ON/OFF shifting of the receiver circuit 3. For receiving the datafile a, b and d the receiver circuit 3' is switched on, which is defined with r.

FIG. 6 is a diagrammatic view of a multiplexed multi-channel transmission according to the present invention. The broadcast transmission 8 comprises a plurality of sub-

15 channels C1, C2, C3...Cx. The letter B defines the total bandwidth of the transmission. The scheduling data signal 23 is embedded in the narrow channel C1, which constitutes the sub-channel 5'. Since the channel C1 is narrow, less energy will be used. The scheduling data signal 23' is processed by the processor unit 15 being controlled to switch on the receiver circuit 3, defined with the letter r, when the

20 specific part 19' of the data 7 will be received. When switching on for receiving the part 19', the scheduling data signal 23'' will be received and signalling that a part 19'' shortly will be transmitted. This ON/OFF schema is illustrated below in the FIG.6. The letter t represents the time the receiver circuit 3' being switched off. The scheduling data signal 23''' controls the receiver circuit 3' to switch on the receiver

25 for reception of the specific part 19''' of the data 7.

Thus, following three embodiments have been explained:

1. The scheduling data signal is embedded in one separate sub-channel (FIG. 6).
 2. The scheduling data signal is embedded in one sub-channel carrying different kind
- 30 of data (FIG. 5).

3. The scheduling data signal is embedded in the broadcast overhead data channel (FIG. 3).

However, FIG. 7 is a diagrammatic view of a broadcast transmission comprising two sub-channels 5''. The broadcast transmission 8 comprises two sub-channels 5'', which sub-channels comprise the scheduling data signal 23. The scheduling data signal 23' signals that, for example, in three hours a specific part 19'' of data will be transmitted for reception on the ether. The embedded scheduling data signal 23'' signals that C2 in four hours will send the specific part 19'''.

The invention is suitably applied on two sub-channels 5'' of a broadcast transmission 8. As shown in FIGS. 5-7, the potential for power consumption is depending on the ratio between wanted or unwanted content. The processor unit 15 of the terminal 1 is adopted to not receive wanted data being repeated. As repetition of data tend to be frequent in data broadcast applications, there is a potential for power saving even in cases when all the transmitted data is wanted.

FIG. 8 shows an example of an embodiment of the invention, in which parts denoted with a reference sign correspond to parts of the earlier mentioned embodiments with the same reference sign. In this way the portable terminal 1 according to the present invention is adopted to save energy by means of earlier received control data 23 comprising information about when data of the broadcast channels is going to be transmitted. Thereby, scheduling information may hereby be received frequently and thus battery is saved.

Since the re-synchronisation time often is very small in relation to the time used for the transmitted data, the oscillator unit 35 can be turned off together with the rest of the receiver circuits. The terminal 1 shown in the FIG. 8 comprises different adopted receiver circuits 3. The scheduling data signal 23 of the narrow channel C1' signals via the processor unit 15 that shortly will a broadcast transmission of C2 to the receiver

circuit 3 appear, wherein the receiver circuit 3 will be switched on for reception of that specific part 19 of data 7 and thereafter switched off for saving energy.

The invention is provided for all digital terrestrial and/or satellit broadcast systems
5 including DAB, DVB, etc., but not limited to these.

CLAIMS

1. A portable electronic receiver terminal (1) for digital services, which terminal (1) comprises a plurality of receiver circuits (3), of which circuits (3) at least one receiver circuit is adopted to receive a transmission of at least one digital broadcast channel (5) comprising data (7), which transmission being transmitted by at least one broadcast transmitter (9), an electrical power supply battery means (11) connected to a processor unit (15) being associated with said receiver circuits (3) and with a storage means (17) for storing said data (7), and said receiver circuit (3) is controlled by said processor unit (15) to receive a specific part (19) of said data (7) for storage in said storage means (17) being used by a client (21) for later consumption, **characterized by** that
- said receiver circuit (3) is adopted to receive, in advance of the transmission of said specific part (19) of said data (7), at least one scheduling data signal (23), such as scheduling information, embedded in said broadcast channel (5), and
 - said processor unit (15) is adopted to control said receiver circuit (3) to receive said specific part (19) of said data (7) by means of at least one of said in advance received scheduling data signal (23), comprising information regarding when said specific part (19) of said data (7) will be transmitted.
2. A portable terminal according to claim 1, wherein a switch member (25) is associated with said electrical power supply battery means (11), said processor unit (15) and said receiver circuit (3), which switch member (25) is controlled by said processor unit (15) and comprises a switch position for activating said receiver circuit (3) for receiving said specific part (19) of said data (7).
3. A portable terminal according to claim 2, wherein said switch member (25) is controlled by said processor unit (15) for turning off said receiver circuit (3) when said specific part (19) of said data (7) has been transmitted.

4. A portable terminal according to claims 1-3, wherein said receiver circuit (3) is adapted to receive a broadcast transmission comprising one channel (5'), which channel (5') comprises said scheduling data signal (23).
5. A portable terminal according to any one of the preceding claims, wherein said receiver circuit (3) is adapted to receive a broadcast transmission comprising a plurality of sub-channels (5''), of which at least one comprises said scheduling data signal (23).
6. A portable terminal according to any one of the preceding claims, wherein said receiver circuit is adapted to receive a broadcast transmission comprising two or more sub-channels (5''), which channels comprise said scheduling data signal (23).
7. A method for operating a portable electronic receiver terminal (1) for digital services, which terminal comprises a plurality of receiver circuits (3), of which circuits (3) at least one receiver circuit is adopted to receive a transmission of at least one digital broadcast channel (5) comprising data (7), which transmission being transmitted by at least one broadcast transmitter (9), an electrical power supply battery means (11) connected to a processor unit (15) associated with said receiver circuits (3) and with a storage means (17) for storing said data (7), and said receiver circuit (3) is controlled by said processor unit (15) to receive a specific part (19) of said data (7) for storage in said storage means (17) being used by a client (21) for later consumption, **characterized by the steps of:**
- receiving a scheduling data signal (23), such as scheduling information, comprising information regarding when the transmission of a specific part (19) of said data (7) will be transmitted,
 - controlling said receiver circuit (3) to receive said specific part (19) of said data (7),
 - storing said specific part (19) of said data (7) in said storage means (17), and
 - using said specific part (19) of said data (7) for later consumption.

8. A method for operating a portable electronic receiver terminal (1) according claim 7, the method further comprising the steps of:

-switching on said receiver circuit (3) to receive said specific part (19) of said data (7),
and

5 -switching off said receiver circuit (3) when said specific part (19) of said data (7) has been transmitted.

9. A broadcast generation system (101) for providing data signals (103) for a transmission of at least one digital broadcast channel (5) comprising data (7), which
10 transmission being provided for a plurality of clients (21) each using a portable electronic receiver terminal (1) for digital services and which broadcast generation system (101) comprises at least one service provider unit (105) for processing service data, such as metadata, raw data etc, which service provider unit (105) is associated with at least one multiplexed broadcast channel unit (107) for providing multiplex
15 output signals for forming transmission frames (109) in a modulator unit (111) adopted for said transmission, **characterized by that**

-said multiplexed broadcast channel unit (107) is adopted to provide said multiplex output signals with at least one scheduling data signal (23), such as scheduling information, comprising information regarding when a specific part (19) of said data
20 (7) will be transmitted,

-said scheduling data signal (23) being transmitted in advance of the transmission of said specific part (19) of said data (7), and

-said scheduling data signal (23) being provided for controlling at least one receiver circuit (3) of said terminal (1) to receive said specific part (19) of said data (7) by
25 means of at least one of said in advance received scheduling data signal (23).

10. A broadcast generation system (101) according to claim 9, wherein said scheduling data signal (23) is adopted for activating said portable electronic receiver terminal (1) for receiving said specific part (19) of said data (7).

11. A broadcast generation system (101) according to claim 9, wherein said scheduling data signal (23) is adopted for turning off said receiver circuit (3) when said specific part (19) of said data (7) has been transmitted.

5 12. A broadcast generation system (101) according to claim 9, wherein said scheduling data signal (23) is transmitted with periodicity, wherein said receiver circuit (3) being activated when said scheduling data signal (23) is transmitted.

13. A broadcast generation system (101) according to claim 9, wherein said scheduling data signal (23) is embedded in one channel (5') of said broadcast transmission.
10

14. A broadcast generation system (101) according to claim 9, wherein said broadcast transmission comprises a plurality of sub-channels (5''), of which at least one comprises said scheduling data signal (23).

15

15. A broadcast generation system (101) according to claim 9, wherein said broadcast transmission comprises two or more sub-channels (5''), which sub-channels comprise said scheduling data signal (23).

20 16. A method for generating at least one digital broadcast channel (5) comprising data (7), which transmission being transmitted to a plurality of clients (21) each using a portable electronic receiver terminal (1) for digital services, wherein a broadcast generation system (101) generating said digital broadcast channel (5), comprises at least one service provider unit (105) for processing service data, such as metadata, raw data etc, which service provider unit (105) is associated with at least one mean service channel unit (107) for providing multiplex output signals for forming transmission frames (109) in a modulator unit (111) adopted for said transmission, **characterized by the steps of:**

-processing in said multiplexed broadcast channel unit (107) said service data for
30 providing a specific part (19) of said data (7) of said broadcast channel,

- providing at least one scheduling data signal (23) comprising information regarding when said specific part (19) of said data (7) will be transmitted,
- transmitting said specific part (19) of said data (7) being received by said portable electronic receiver terminal (1).

5

17. A method for generating at least one digital broadcast channel (5) according to claim 16, the method further comprising the steps of:

- providing a broadcast transmission comprising one channel (5'), which channel (5') comprises said scheduling data signal (23).

10

18. A method for generating at least one digital broadcast channel (5) according to claim 16, the method further comprising the steps of:

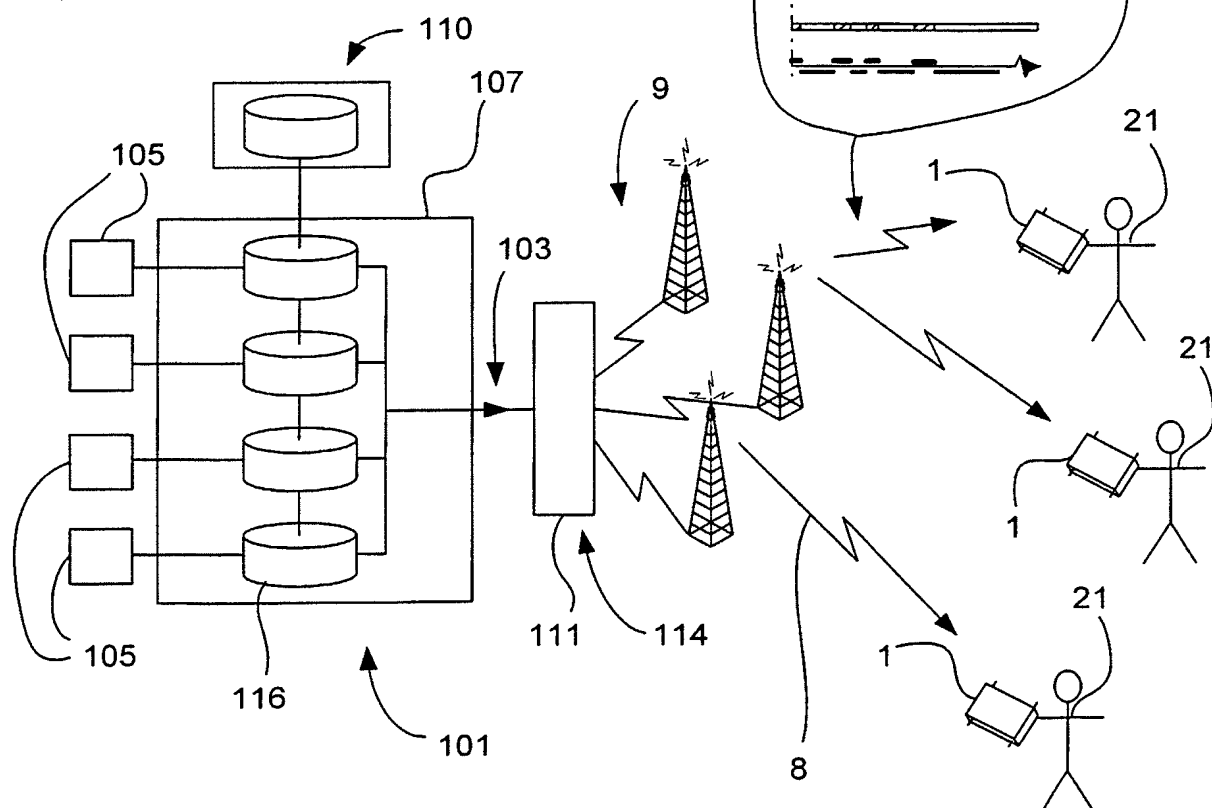
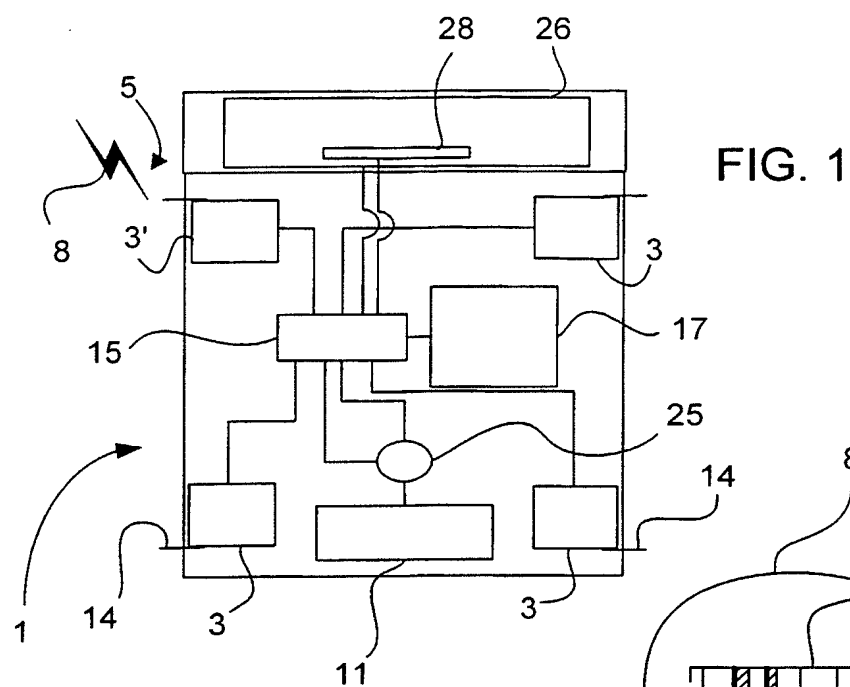
- providing a broadcast transmission comprising a plurality of sub-channels (5''), of which at least one comprises said scheduling data signal (23).

15

19. A method for generating at least one digital broadcast channel (5) according to claim 16, the method further comprising the steps of:

- providing a broadcast transmission comprising two or more sub-channels (5''), which channels comprise said scheduling data signal (23).

20



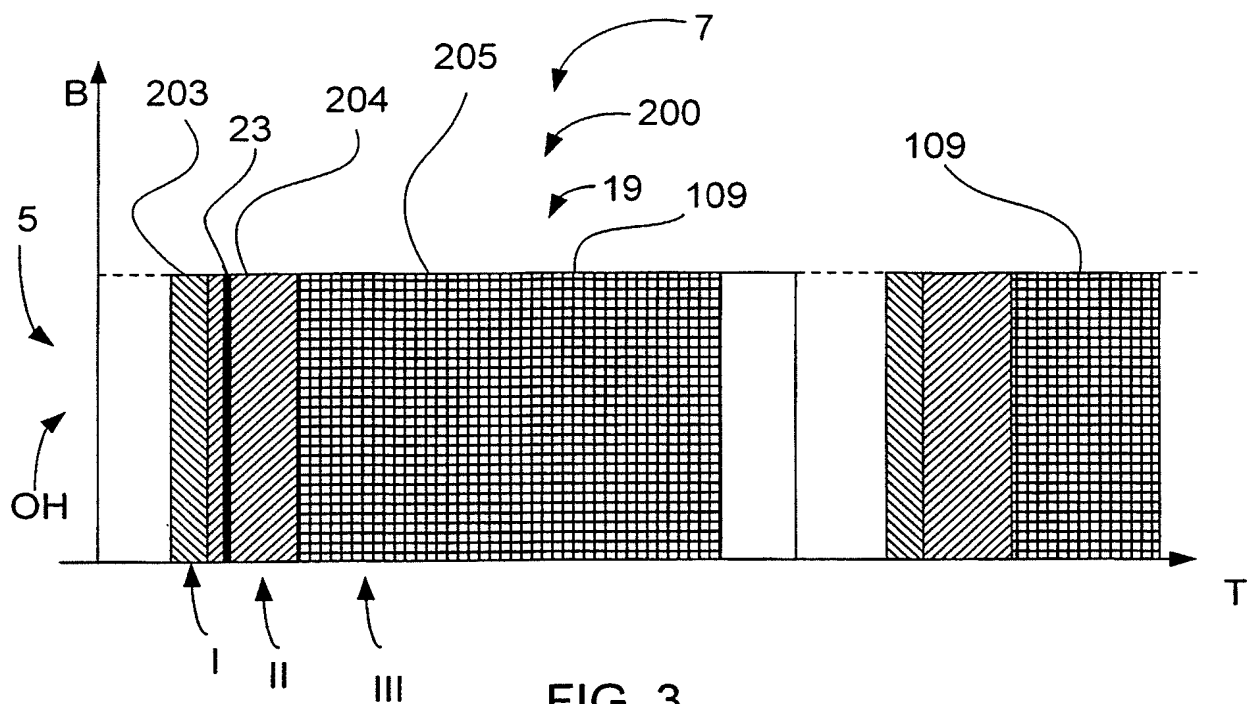


FIG. 3

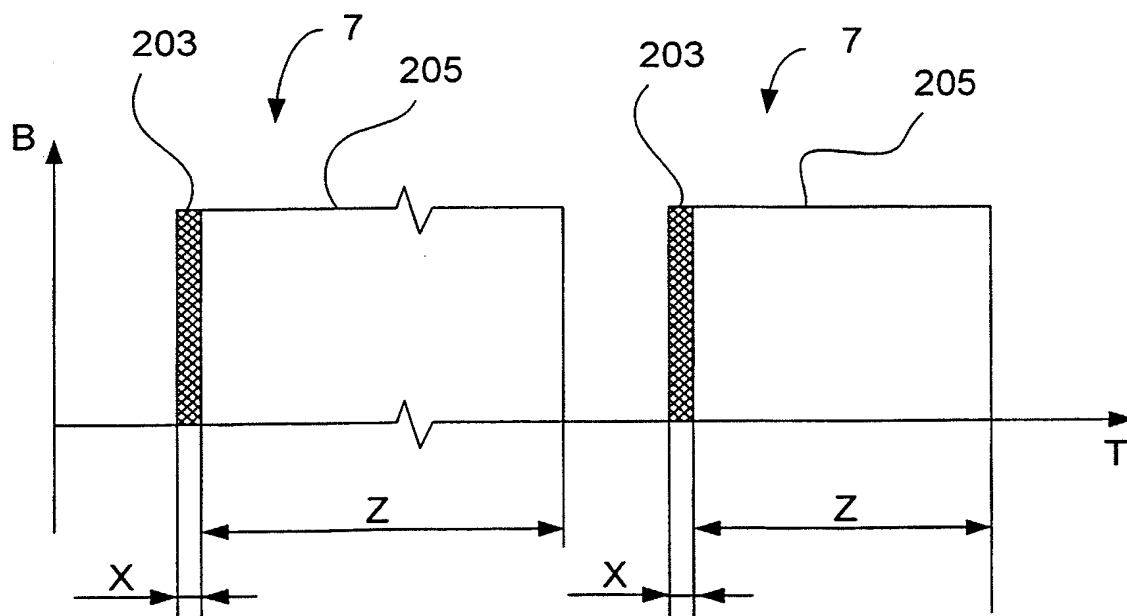


FIG. 4

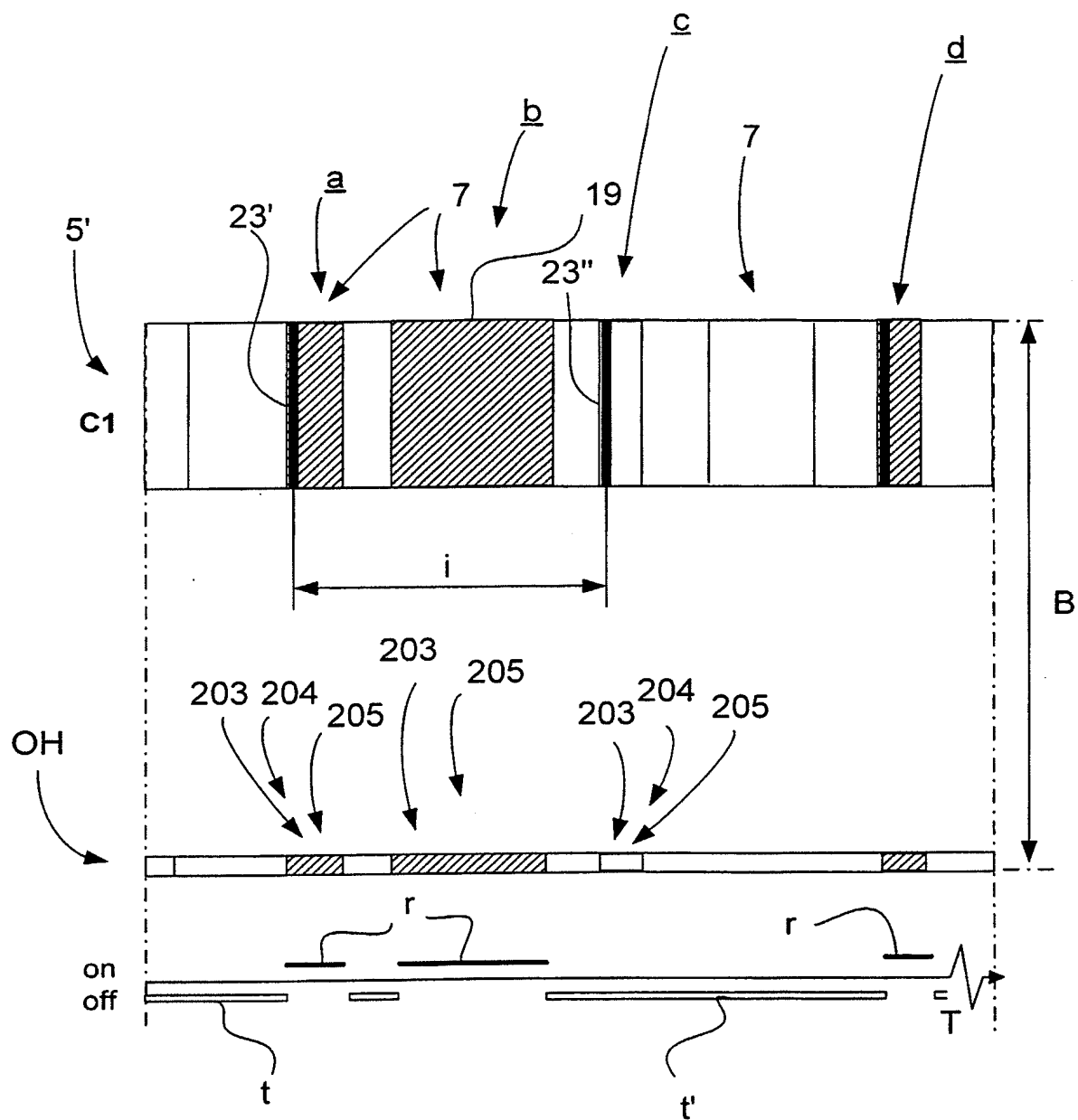


FIG. 5

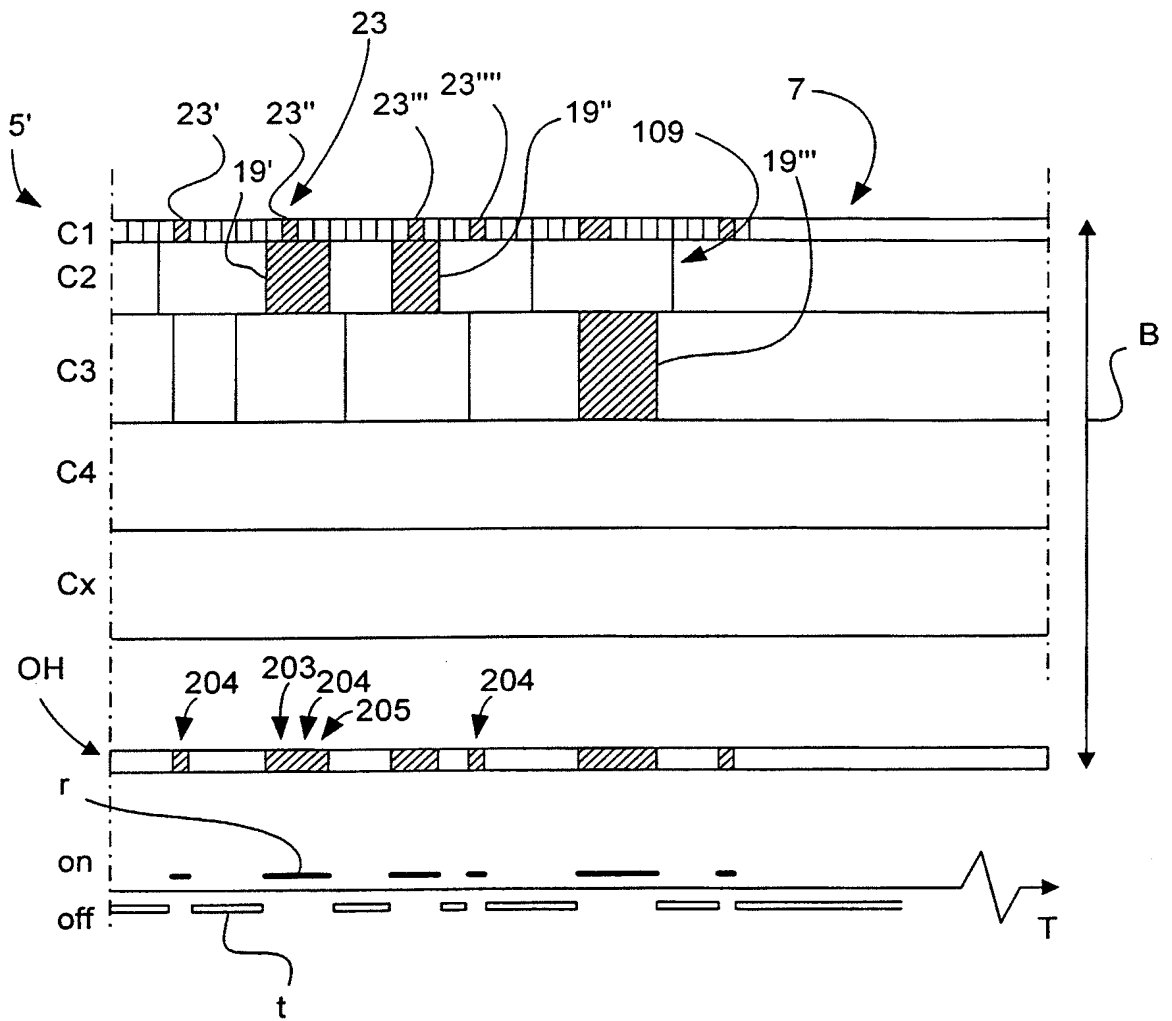


FIG. 6

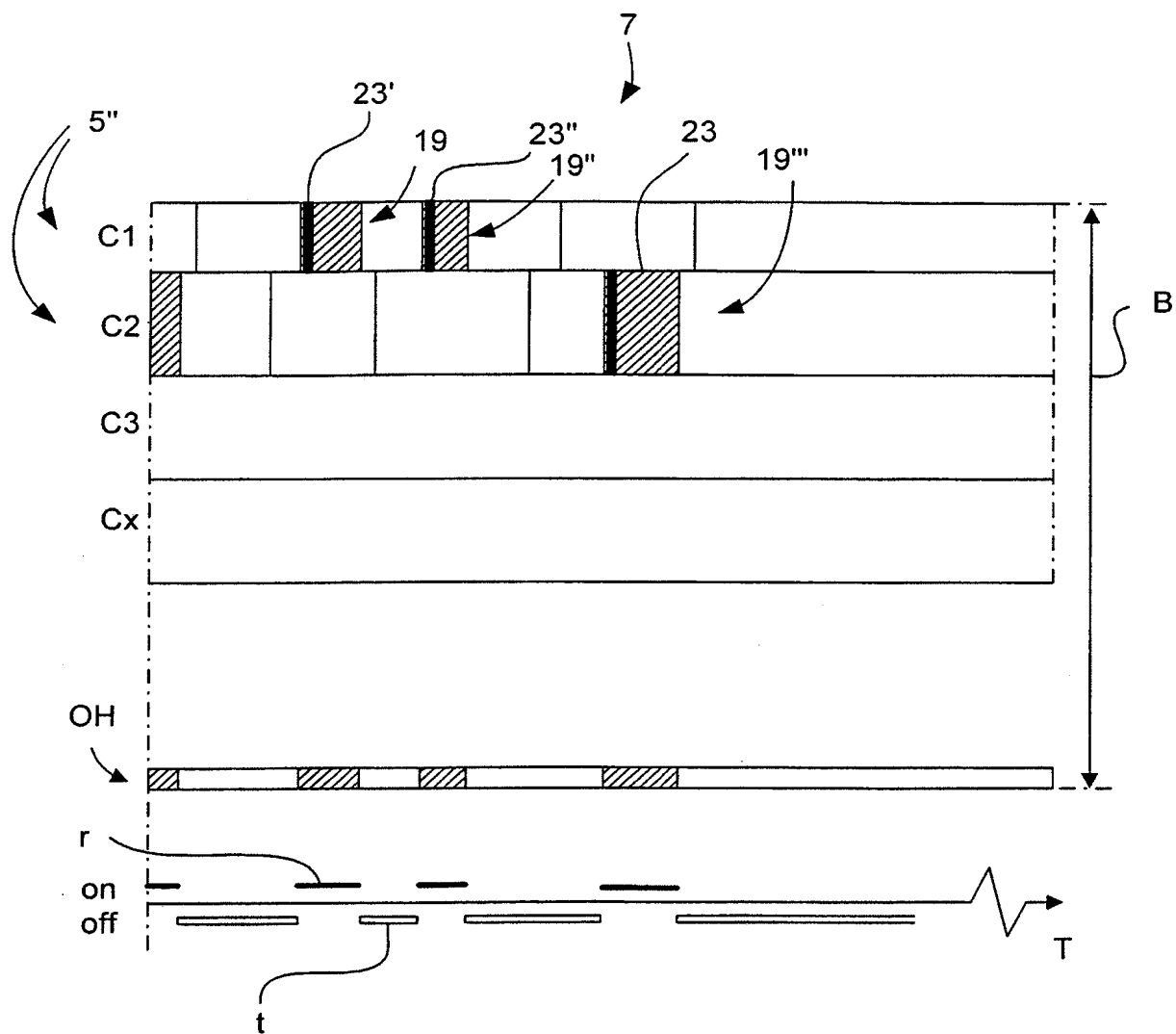


FIG. 7

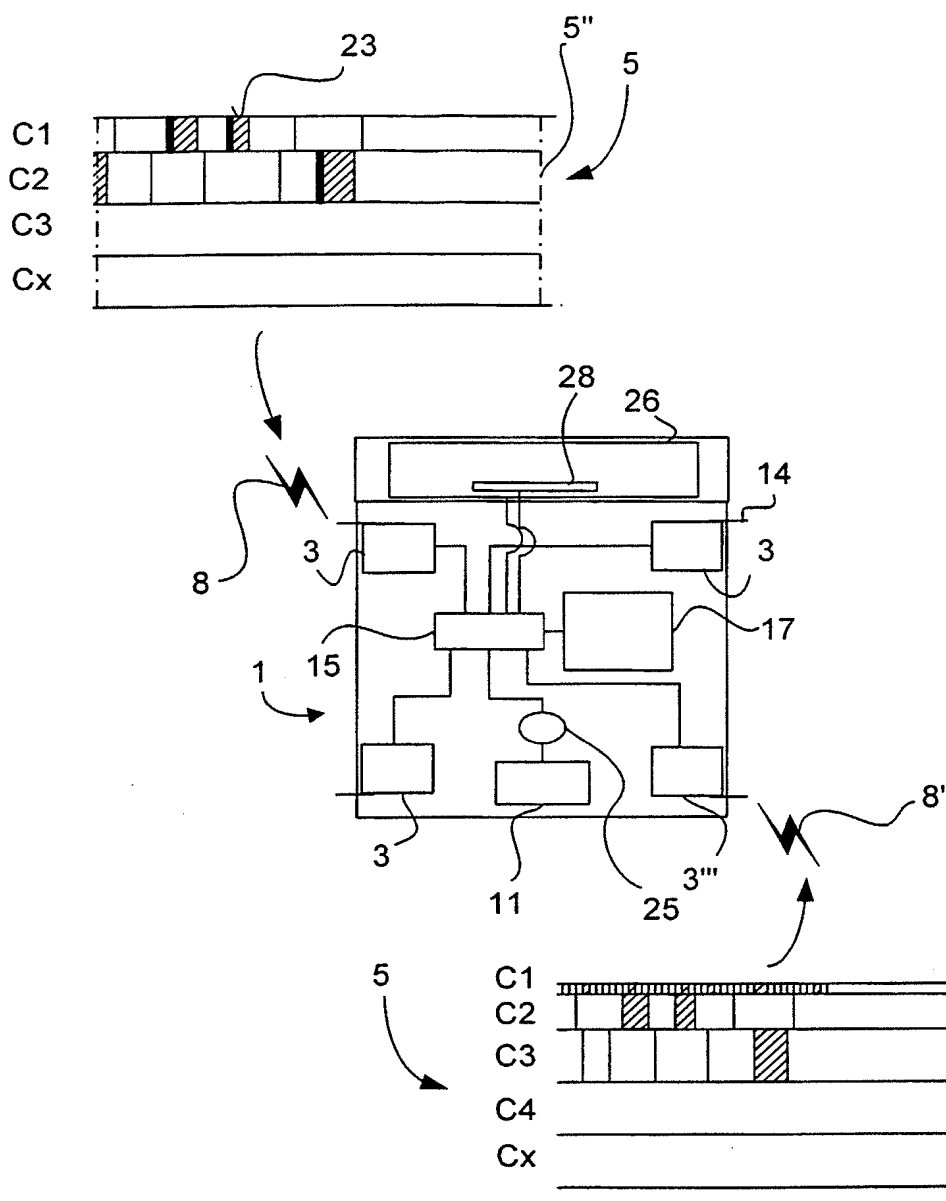


FIG. 8

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/18 // H04H 1/00, H04B 1/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q, H04H, H04B, G08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5382949 A (VON A. MOCK ET AL), 17 January 1995 (17.01.95), column 2, line 32 - line 59; column 6, line 3 - line 12, abstract --	1-19
X	US 6138032 A (THOMAS CASELY HILL ET AL), 24 October 2000 (24.10.00), column 2, line 2 - line 32, abstract --	1-19
X	EP 0735787 A2 (CASIO COMPUTER CO., LTD.), 2 October 1996 (02.10.96), column 3, line 4 - line 20; column 4, line 28 - line 33, abstract --	1-19

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5309154 A (KYUNG T. MUN ET AL), 3 May 1994 (03.05.94), column 5, line 14 - line 21; column 6, line 45 - column 7, line 17, abstract --	1-19
A	US 5929773 A (ROBERT NATHAN NELMS ET AL), 27 July 1999 (27.07.99), column 1, line 12 - line 36, claim 1, abstract -- -----	1-19

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INTERNATIONAL SEARCH REPORT

International application No.

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Patent document cited in search report			Publication date	Patent family member(s)		Publication date
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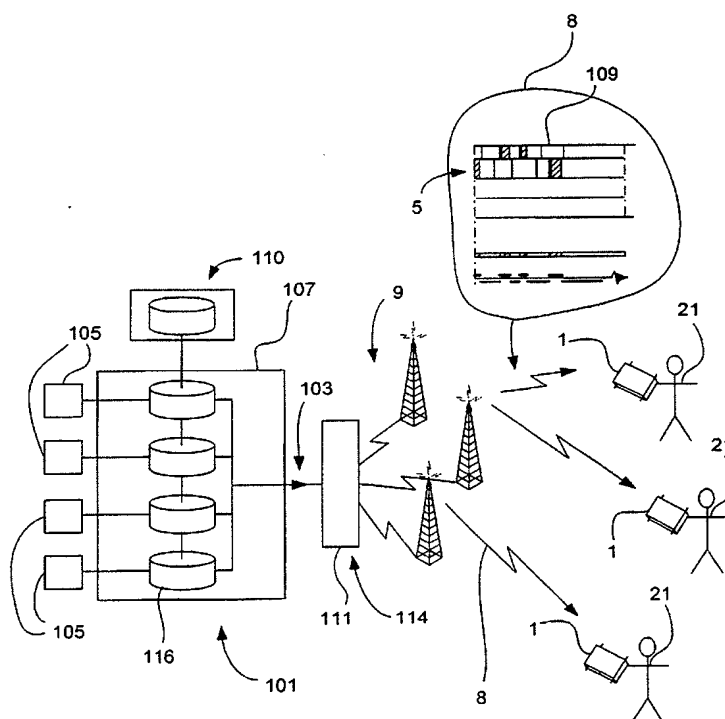
(75) Inventor/Applicant (*for US only*): **ÅHLUND, Mats**
[SE/SE]; Skogalundsvägen 3, S-131 42 Nacka (SE).

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[Continued on next page]

(54) Title: A PORTABLE RECEIVER AND A BROADCAST SYSTEM AND OPERATING METHODS



(57) Abstract: A portable electronic receiver terminal (1) for digital services, which terminal (1) comprises a plurality of receiver circuits (3), of which circuits (3) at least one receiver circuit is adopted to receive a transmission of at least one digital broadcast channel (5) comprising data (7), which transmission being transmitted by at least one broadcast transmitter (9), an electrical power supply battery means (11) connected to a processor unit (15) being associated with said receiver circuits (3) and with a storage means (17) for storing said data (7), and said receiver circuit (3) is controlled by said processor unit (15) to receive a specific part (19) of said data (7) for storage in said storage means (17) being used by a client (21) for later consumption. Said receiver circuit (3) is adopted to receive, in advance of the transmission of said specific part (19) of said data (7), at least one scheduling data signal (23), such as scheduling information, embedded in said broadcast channel (5), said processor unit (15) is adopted to control said receiver circuit (3) to receive said specific part (19) of said data (7) by means of at least one of said in advance received scheduling data signal (23), comprising information regarding when said specific part (19) of said data (7) will be transmitted.

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(88) Date of publication of the revised international search
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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A. CLASSIFICATION OF SUBJECT MATTER

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IPC7: H04Q, H04H, H04B, G08B, G06F, H04N

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Åsa Hällgren/mj Telephone No. +46 8 782 25 00

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INTERNATIONAL SEARCH REPORT

International application No.

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INTERNATIONAL SEARCH REPORT

Information on patent family members*

30/12/02

International application No.

PCT/SE 02/00603

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